Appendix C

Technical Notes

Data Sources

The *Electric Power Monthly (EPM)* is prepared by the Electric Power Division, Office of Coal, Nuclear, Electric and Alternate Fuels (CNEAF), Energy Information Administration (EIA), U.S. Department of Energy. Data published in the EPM are compiled from the following data sources: Form EIA-759, "Monthly Power Plant Report," Form EIA-900, "Monthly Nonutility Power Report," FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants," Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions," Form EIA-861, "Annual Electric Utility Report," Form EIA-860A, "Annual Electric Generator Report–Utility," Form EIA-860B, "Annual Electric Generator Report–Nonutility," and the Form EIA-906, "Power Plant Report (Regulated and Nonregulated).

Form EIA-759

The Form EIA-759 is a cutoff model sample of approximately 240 electric utilities drawn from the frame of all operators of electric utility plants (approximately 700 electric utilities) that generate electric power for public use. Data will be collected on an annual basis from the remaining operators of electric utility plants. The new monthly data collection is from all utilities with at least one plant with a nameplate capacity of 50 megawatts or more. (Note: includes all nuclear units). However, the few utilities that generate electricity using renewable fuel sources other than hydroelectric are all included in the sample. The Form EIA-759 is used to collect monthly data on net generation; consumption of coal, petroleum, and natural gas; and end-of-the-month stocks of coal and petroleum for each plant by fuel-type combination. Summary data from the Form EIA-759 are also contained in the *Electric Power Annual (EPA)*, *Monthly Energy Review (MER)*, and the *Annual Energy Review (AER)*. These reports present aggregate data estimates for electric utilities at the U.S., Census division, and North American Electric Reliability Council Region (NERC) levels.

Instrument and Design History. Prior to 1936, the Bureau of the Census and the U.S. Geological Survey collected, compiled, and published data on the electric power industry. In 1936, the Federal Power Commission (FPC) assumed all data collection and publication responsibilities for the electric power industry and implemented the FPC Form 4. The Federal Power Act, Sections 311 and 312, and FPC Order 141 define the legislative authority to collect power production data. The Form EIA-759 replaced the FPC Form 4 in January 1982. In January 1996, the Form EIA-759 was changed to collect data from a cutoff model sample of plants with a nameplate capacity of 25 megawatts or more. In January 1999, the Form EIA-759 was changed to collect data for a cutoff sample of plants with a nameplate capacity of 50 megawatts or more.

Data Processing. The Form EIA-759, along with a return envelope, is mailed to respondents approximately 4 working days before the end of the month. The completed forms are to be returned to the EIA by the 10th day after the end of the reporting month. After receipt, data from the completed forms are manually logged in and edited before being keypunched for automatic data processing. An edit program checks the data for errors not found during manual editing. The electric utilities are telephoned to obtain data in cases of missing reports and to verify data when questions arise during editing. After all forms are received from the respondents, the final automated edit is submitted. Following verification of the data, text and tables of aggregated data are produced for inclusion in the *EPM*. Following EIA approval of the *EPM*, the data are made available for public use, on a cost-recovery basis, through custom computer runs, data tapes, or in publications.

FERC Form 423

The Federal Energy Regulatory Commission (FERC) Form 423 is a monthly record of delivered-fuel purchases, submitted by approximately 230 electric utilities for each electric generating plant with a total steam-electric and combined-cycle nameplate capacity of 50 or more megawatts. Summary data from the FERC Form 423 are also contained in the *EPA, MER*, and the *Cost and Quality of Fuels for Electric Utility Plants – Annual.* These reports present aggregated data on electric utilities at the U.S., Census division, and State levels.

Instrument and Design History. On July 7, 1972, the FPC issued Order Number 453 enacting the New Code of Federal Regulations, Section 141.61, legally creating the FPC Form 423. Originally, the form was used to collect data only on fossil-steam plants, but was amended in 1974 to include data on internal combustion and combustion turbines. The FERC Form 423 replaced the FPC Form 423 in January 1983. The FERC Form 423 eliminated

peaking units, which were previously collected on the FPC Form 423. In addition, the generator nameplate capacity threshold was changed from 25 megawatts to 50 megawatts. This reduction in coverage eliminated approximately 50 utilities and 250 plants. All historical FPC Form 423 data in this publication were revised to reflect the new generator nameplate capacity threshold of 50 or more megawatts reported on the FERC Form 423. In January 1991, the collection of data on the FERC Form 423 was extended to include combined-cycle units. Historical data have not been revised to include these units. Starting with the January 1993 data, the FERC began to collect the data directly from the respondents.

Data Processing. The FERC processes the data through edits and each month provides the EIA with a diskette containing the data. The EIA reviews the data for accuracy. Beginning with May 1994 data, an additional quality check began in which coal data are compared with data prepared by Resource Data International, Inc., of Boulder, Colorado. Following verification of the data, text and tables of aggregated data are produced for inclusion in the *EPM*. After the *EPM* is cleared by the EIA, the data become available for public use, on a cost-recovery basis, through custom computer runs or in publications.

Form EIA-826

The Form EIA-826 is a monthly collection of data from approximately 340 of the largest primarily investor-owned and publicly owned electric utilities as well as a census of energy service producers with retail sales in deregulated States. A model is then applied to estimate for the entire universe of U.S. electric utilities. The electric power sales data are used by the Federal Reserve Board in their economic analyses.

Instrument and Design History. The collection of electric power sales, revenue, and income data began in the early 1940's and was established as FPC Form 5 by FPC Order 141 in 1947. In 1980, the report was revised with only selected income items remaining and became the FERC Form 5. The Form EIA-826 replaced the FERC Form 5 in January 1983. In January 1987, the Form EIA-826 was changed to the "Monthly Electric Utility Sales and Revenue Report with State Distributions." It was formerly titled, "Electric Utility Company Monthly Statement." The Form EIA-826 was revised in January 1990, and some data elements were eliminated. In 1993, EIA for the first time used a model sample for the Form EIA-826. A stratified-random sample, employing auxiliary data, was used for each of the 4 previous years. (See previous issues of this publication, and (Knaub, 12) for details.) The current sample for the Form EIA-826, which was designed to obtain estimates of electricity sales and revenue per kilowatthour at the State level by end-use sector, was chosen to be in effect for the January 1993 data.

Frame. The frame for the Form EIA-826 was originally based on the 1989 submission of the Form EIA-861 (Section 1.4), which consisted of approximately 3,250 electric utilities selling retail and/or sales for resale. Note that for the Form EIA-826, the EIA is only interested in retail sales. Updates have been made to the frame to reflect mergers that affect data processing. Some electric utilities serve in more than one State. Thus, the State-service area is actually the sampling unit. For each State served by each utility, there is a utility State-part, or "State-service area." This approach allows for an explicit calculation of estimates for sales, revenue, and revenue per kilowatthour by end-use sector (residential, commercial, industrial and other) at State, Census division, and the U.S. level. Regressor data came from the Form EIA-861. (Note that estimates at the "State level" are for sales for the entire State, and similarly for "Census division" and "U.S." levels.)

The preponderance of electric power sales to ultimate consumers in each State are made by a few large utilities. Ranking of electric utilities by retail sales on a State-by-State basis revealed a consistent pattern of dominance by a few electric utilities in nearly all 50 States and the District of Columbia. These dominant electric utilities were selected as a model sample. These electric utilities constitute about 8 percent of the population of U.S. electric utilities, but provide three-quarters of the total U.S. retail electricity sales. The procedures used to derive electricity sales, revenue, revenue per kilowatthour, and associated relative standard error (RSE) estimates are provided in the Form EIA-826 subsection of the Formulas Data Section. See (Knaub, 12) for a study of RSE estimates for this survey. In 2001, EIA began collecting from a census of investor-owned utilities for the EIA-826, based upon the prior-year EIA-861 frame. The model-based sampling now applies only to the municipal, cooperative, and Federally-owned utilities.

Data Processing. The forms are mailed each year to the electric utilities with State-parts selected in the sample. The completed form is to be returned to the EIA by the last calendar day of the month following the reporting month. Nonrespondents are telephoned to obtain the data. Imputation, in model sampling, is an implicit part of the estimation. That is, data that are not available, either because it was not part of the sample or because the data are missing, are estimated using a model. The data are edited and entered into the computer where additional checks are completed. After all forms have been received from the respondents, the final automated edit is submitted. Following verification, tables and text of the

aggregated data are produced for inclusion in the EPM. After the *EPM* receives clearance from the EIA, the data are made available for public use through custom computer runs, data tapes, or in publications (*EPA, AER*) on a cost-recovery basis.

Form EIA-900

The Form EIA-900, "Monthly Nonutility Power Report," is a cutoff model sample drawn from the frame for the Form EIA-860B, "Annual Electric Generator Report – Nonutility." Members of the Form EIA-860B frame with nameplate capacity greater than or equal to 50 megawatts constitute the sample for the Form EIA-900. The Form EIA-900 currently is used to collect monthly data on net generation; consumption of coal, petroleum, and natural gas; and end-of-the month stocks of coal and petroleum.

Instrument and Design History. The Form EIA-900 was implemented to collect monthly data, starting with January 1996. The reason for its inception was to fill, in part, a "data gap" that existed on a monthly basis when comparing utility sales to end users (from the Form EIA-826) with utility generation (from the Form EIA-759). This data gap occurred because utility sales data include electricity purchased from nonutilities and because of other factors such as transmission losses and imports/exports. In light of sampling and nonsampling error, a more complete description of events may be gleaned by including results based on the Form EIA-900.

Data Processing. The Form EIA-900 is mailed to all operating Form EIA-860B respondent facilities with more than 50 megawatts of total operating capacity. In 1996, there were approximately 380 respondents for the Form EIA-900. Data submission is allowed by Internet e-mail, postal mail, telephone or facsimile (FAX) transmission. In the near future, the EIA plans to allow touchtone data entry. At first submission, the number for the one datum element collected is compared to a previously submitted number, through the use of an interactive edit. Later, batch edits are applied. One edit is used to compare total sales, generation, line losses and imports/exports to determine if the results are reasonable. Another edit is applied on an individual, annual basis, to compare 12 month totals for the Form EIA-900 submissions to the corresponding Form EIA-860B submissions.

Form EIA-861

The Form EIA-861 is a mandatory census of electric utilities in the United States. The survey is used to collect information on power production and sales data from approximately 3,250 electric utilities. The data collected are used to maintain and update the EIA's electric utility frame data base. This data base supports queries from the Executive Branch, Congress, other public agencies, and the general public. Summary data from the Form EIA-861 are also contained in the *Electric Sales and Revenue*; the *Electric Power Annual*; the *Financial Statistics of Selected Publicly Owned Electric Utilities*; the *Financial Statistics of Selected Investor-Owned Electric Utilities*; the *AER*; and, the *Annual Outlook for U.S. Electric Power*. These reports present aggregate totals for electric utilities on a national level, by State, and by ownership type.

Instrument and Design History. The Form EIA-861 was implemented in January 1985 to collect data as of year-end 1984. The Federal Administration Act of 1974 (Public Law 93-275) defines the legislative authority to collect these data.

Data Processing. The Form EIA-861 is mailed to the respondents in February of each year to collect data as of the end of the preceding calendar year. The data are manually edited before being entered into the interactive on-line system. Internal edit checks are performed to verify that current data total across and between schedules, and are comparable to data reported the previous year. Edit checks are also performed to compare data reported on the Form EIA-861 and similar data reported on the Forms EIA-826; EIA-412, "Annual Report of Public Electric Utilities;" and FERC Form 1, "Annual Report of Major Electric Utilities, Licensees, and Others." Respondents are tele-phoned to obtain clarification of reported data and to obtain missing data.

Form EIA-860A

The Form EIA-860A is a mandatory census of electric utilities in the United States that operate power plants or plan to operate a power plant within 5 years of the reporting year. The survey is used to collect data on electric utilities' existing power plants and their 5-year plans for constructing new plants, generating unit additions, modifications, and retirements in existing plants. Data on the survey are collected at the generating unit level. These data are then aggregated to provide totals by energy source (coal, petroleum, gas, water, nuclear, other) and geographic area (State, NERC region, Federal region, Census division). Additionally, at the national level, data are aggregated to provide totals by prime mover. Data from the Form EIA-860 are also summarized in the *Inventory of Power Plants in the United States* and the *EPA*, and as input to publications (AER) and studies by other offices in the Department of Energy.

Instrument and Design History. The Form EIA-860A was implemented in January 1999 to collect data as of January 1, 1999. The Federal Energy Administration Act of 1974 (Public Law 93-275) defines the legislative

authority to collect these data. Form EIA-860A replaced Form EIA-860, "Annual Electric Generating Report." The difference in the data requirements of Form EIA-860A and those of the Form EIA-860 that preceded it is that respondents are required to report 5-year plans on Form EIA-860A instead of 10-year plans previously required to be reported on Form EIA-860.

Data Processing. The Form EIA-860A is mailed to approximately 900 respondents in November or December to collect data as of January 1 of the reporting year, where the reporting year is the calendar year in which the report was filed. Effective with the 1996 reporting year, respondents have the option of filing Form EIA-860A directly with the EIA or through an agent, such as the respondent's regional electric reliability council. Data reported through the regional electric reliability councils are submitted to the EIA electronically from the North American Electric Reliability Council (NERC). Data for each respondent are preprinted from the applicable data base. Respondents are instructed to verify all preprinted data and to supply missing data. The data are manually edited before being keypunched for automatic data processing. Computer programs containing additional edit checks are run. Respondents are telephoned to obtain correction or clarification of reported data and to obtain missing data, as a result of the manual and automatic editing process.

Form EIA-860B

The Form EIA-860B is a mandatory survey of all existing and planned nonutility electric generating facilities in the United States with a total generator nameplate capacity of 1 or more megawatts. In 1992, the reporting threshold of the Form EIA-860B was lowered to include all facilities with a combined nameplate capacity of 1 or more megawatts. Previously, data were collected every 3 years from facilities with a nameplate capacity between 1 and 5 megawatts. Planned generators are defined as a proposal by a company to install electric generating equipment at an existing or planned facility. The proposal is based on the owner having obtained (1) all environmental and regulatory approvals, (2) a contract for the electric energy, or (3) financial closure on the facility. The Form consists of Schedules I, "Identification and Certification;" Schedule II, "Facility Information"; Schedule III, "Standard Industrial Classification Code Designation"; Schedule IVA, "Facility Fuel Information"; Schedule IVB, "Facility Thermal and Generation Information"; Schedule V, "Facility Environmental Information"; and Schedule VI, "Electric Generator Information."

Submission of the Form EIA-860B is required from all facilities that have a combined facility nameplate capacity of 1 megawatt or more. Schedule V, "Facility Environmental Information" is only required of those facilities of 25 megawatts or more.

The form is used to collect data on the installed capacity, energy consumption, generation, and electric energy sales to electric utilities and other nonutilities by facility. Additionally, the form is used to collect data on the quality of fuels burned and the types of environmental equipment used by the respondent. These data are aggregated to provide geographic totals for selected States and at the Census division and national levels. Since the Form EIA-860B data are considered confidential, suppression of some data is necessary to protect the confidentiality of the individual respondent data. See "Confidentiality of the Data" in this section for further information.

Instrument and Design History. The Form EIA-867, "Annual Nonutility Power Producer Report," was implemented in December 1989 to collect data as of year-end 1989. The Federal Energy Administration Act of 1984 (Public Law 93-275) defines the legislative authority to collect these data. Form EIA-860B, "Annual Electric Generating Report – Nonutility," replaced Form EIA-867 in 1998.

Data Processing. The Form EIA-860B is mailed to the respondents in January to collect data as of the end of the preceding calendar year. Static data for each respondent are preprinted from the previous year, and the respondents are instructed to verify all preprinted information and to supply the missing data. The completed forms are to be returned to the EIA by April 30. The response rate for all facilities for which addresses were confirmed was 100 percent. The data are manually edited before being keyed for automatic data processing. Computer programs containing additional edit checks are run. Respondents are telephoned to obtain corrections or clarifications of reported data and to obtain missing data as a result of the manual and automated editing.

Form EIA-906

In January 2001, Form EIA-906 superseded Forms EIA-759 and 900. The Form EIA-906 collects monthly plant-level data on generation, fuel consumption, stocks and useful thermal output from electric utilities and nonutilities. It is a model-based sample of approximately 240 electric utilities and 800 nonutilities.

The census data from Form EIA-860B are used as regressors in a regression model that estimates (imputes) values for those not collected on the sample. The relationship between the data that are collected on the sample and the corresponding regressor data is needed to impute these values and arrive at aggregate level estimates. The modeling is described in detail in the Internet statistics

journal, *InterStat*, August 1999, "Using Prediction Oriented Software for Survey Estimation," http://interstat.stat.vt.edu/InterStat/ARTICLES/1999/abstracts/99001.html-ssi. For a more general discussion of model-based sampling and estimation, please see the EIA website at http://www.eia.doe.gov/cneaf/electricity/forms/eiawebme.pdf. Note that there are times when a model may not apply, such as for a new plant, when the relationship between the variable of interest and the regressor data does not hold. In such a case, the new information represents only itself, and such numbers are added to model results when estimating totals. Further, there are times when sample data may be known to be in error, or are not reported. Such cases are treated as if they were never part of the model-based sample, and values are imputed. The data processing procedures for Form EIA-906 are the same as those described for Forms EIA-759 and EIA-900.

Note that there are times when a model may not apply, such as in the case of a substantial reclassification of sales, when the relationship between the variable of interest and the regressor data does not hold. In such a case, the new information represents only itself, and such numbers are added to model results when estimating totals. Further, there are times when sample data may be known to be in error, or are not reported. Such cases are treated as if they were never part of the model-based sample, and values are imputed.

Formulas/Methodologies

The following formula is used to calculate percent differences.

$$\text{Percent Difference} = \left(\frac{x\ (t_2) - x\ (t_1)}{x\ (t_1)} \right) x\ 100,$$

where $x\ (t_1)$ and $x\ (t_2)$ denote the quantity at year t_1 and subsequent year t_2.

Form EIA-826

The Form EIA-826 data are collected at the utility level by sector and State. Data from the Form EIA-826 are used to determine estimates by sector at the State, Census division, and national level for the entire corresponding State, Census division, or national category. Form EIA-861 data were used as the frame from which the sample was selected, and also as regressor data.

The sample consists of approximately 340 electric utilities, as well as a census of energy service providers with retail sales in deregulated States. This includes a somewhat larger number of State-service areas for electric utilities. Estimation procedures include imputation to account for nonresponse. Nonsampling error must also be considered. The nonsampling error is not estimated directly, although attempts are made to minimize it.

State-level sales and revenue estimates are calculated. Also, a ratio estimation procedure is used for estimation of revenue per kilowatthour at the State level. These estimates are accumulated separately to produce the Census division and U.S. level estimates.

The relative standard error (RSE) statistic, usually given as a percent, describes the magnitude of sampling error that might reasonably be incurred. The RSE is the square root of the estimated variance, divided by the variable of interest. The variable of interest may be the ratio of two variables (for example, revenue per kilowatthour), or a single variable (for example, sales).

The sampling error may be less than the nonsampling error. Nonsampling errors may be attributed to many sources, including the response errors, definitional difficulties, differences in the interpretation of questions, mistakes in recording or coding data obtained, and other errors of collection, response, or coverage. These nonsampling errors also occur in complete censuses. In a complete census, this problem may become unmanageable. One indicator of the magnitude of possible nonsampling error may be gleaned by examining the history of revisions to data for a survey (Table B2).

Relative standard errors (RSEs) are indicators of error due to sampling. (RSEs do not account for nonsampling errors, such as errors of misclassification or transposed digits. However, estimates of RSEs, although not designed to measure nonsampling error, are affected by them). In fact, large RSE estimates found in preliminary work with these data have often indicated nonsampling errors, which were then identified and corrected. Using the Central Limit Theorem, which applies to sums and means such as are applicable here, there is approximately a 68-percent chance that the true sampling error is less than the corresponding RSE. Note that reported RSEs are always estimates, themselves, and are usually, as here, reported as percents. As an example, suppose that a revenue-per-kilowatthour value is estimated to be 5.13 cents per kilowatthour with an estimated RSE of 1.6 percent. This means that, ignoring any nonsampling error, there is approximately a 68-percent chance that the true average revenue per kilowatthour is within approximately 1.6 percent of 5.13 cents per kilowatthour (that is, between 5.05 and 5.21 cents per kilowatthour). There is approximately a 95-percent chance of a true sampling error being 2 RSEs or less.

The basic approach is shown in (Royall, 6) with additional discussion of variance estimation in (Royall and Cumberland, 7), (Royall and Cumberland, 8), and (Knaub, 5).

The detailed methodology for estimation for this survey is described in InterStat, June 2000, "Using Prediction-Oriented Software for Survey Estimation - Part II: Ratios of Totals," http://interstat.stat.vt.edu/InterStat/ARTICLES/2000/abstracts/U00002.html-ssi.

Note that there are times when a model may not apply, such as in the case of a substantial reclassification of sales, when the relationship between the variable of interest and the regressor data does not hold. In such a case, the new information represents only itself, and such numbers are added to model results when estimating totals. Further, there are times when sample data may be known to be in error, or are not reported. Such cases are treated as if they were never part of the model-based sample, and values are imputed.

As a final adjustment based on our most complete data, use is made of final Form EIA-861 data, when available. The annual totals for Form EIA-826 data by State and end-use sector are compared to the corresponding Form EIA-861 values for sales and revenue. The ratio of these two values in each case is then used to adjust each corresponding monthly vale.

Additional information or clarification can be addressed to the Energy Information Administration as indicated in the "Contacts" section of this publication.

Form EIA-900

The Form EIA-900 data are collected at the facility level, which is roughly the nonutility equivalent of plant level. The cutoff sample uses generation to determine the estimated total nonutility monthly generation based on the annual Form EIA-860B, "Annual Generator Report – Nonutility," data available. Fuel consumption estimates are based on relating the estimated monthly generation to the consumption data for the Form EIA-860B.

Form EIA-759

Data for the Form EIA-759 are collected at the plant level. Estimates are then provided for geographic levels. Consumption of fuel(s) is converted from quantities (in short tons, barrels, or thousand cubic feet) to Btu at the plant level. End-of-month fuel stocks for a single generating plant may not equal beginning-of-the-month stocks plus receipts less consumption, for many reasons, including the fact that several plants may share the same fuel stock.

A cutoff model sampling and estimation are employed, using the same multiple regression model. Once again, as described under the corresponding subsection on the Form EIA-900, details of the estimation of totals and variances of totals are published on the Internet in a paper entitled "Weighted Multiple Regression Estimation for Survey Model Sampling (Knaub, 13)."

At the fuel and State level (i.e., lowest aggregate level), there are a number of cases where the minimal sample size of three is not met, when using a 25 MW cutoff. Imputation of historic values for the smallest plants is used to supplement actual values for the largest ones. However, at the NERC level, this is not necessary. Data element totals for each NERC region, by fuel type, are estimated using model sampling. These samples are composed solely of data reported for the plants actually in the sample. The national level estimate from this is then considered our best estimate, and all other estimates are apportioned accordingly.

As a final adjustment based on our most complete data, use is made of final Form EIA-759 annual census, when available. The annual census for Form EIA-759 data by State and energy source are compared to the corresponding monthly Form EIA-759 values. The ratio of these two values in each case is then used to adjust each corresponding monthly value.

FERC Form 423

Data for the FERC Form 423 are collected at the plant level. These data are then used in the following formulas to produce aggregates and averages for each fuel type at the State, Census division, and U.S. level. For these formulas, receipts and average heat content are at the plant level. For each geographic region, the summation $\sum$ represents the sum of all plants in that geographic region. Additionally,

For coal, units for receipts (R) are in tons, units for average heat content (A) are in Btu per pound, and the unit conversion (U) is 2,000 pounds per ton;

For petroleum, units for receipts (R) are in barrels, units or average heat content (A) are in Btu per gallon, and the unit conversion (U) is 42 gallons per barrel;

For gas, units for receipts (R) are in thousand cubic feet (Mcf), average heat content (A) are in Btu per cubic foot, and the unit conversion (U) is 1,000 cubic feet per Mcf.

$$\text{Total Btu} = \sum_i (R_i \times A_i \times U),$$

where I denotes a plant; R_i = receipts for plant I;
A_i = average heat content for receipts at plant I; and,

U = unit conversion;

$$\text{Weighted Average Btu} = \frac{\sum_i (R_i \times A_i)}{\sum_i R_i},$$

where I denotes a plant; R_i = receipts for plant I; and, A_i = average heat content for receipts at plant I.

The weighted average cost in cents per million Btu is calculated using the following formula:

$$\text{Weighted Average Cost} = \frac{\sum_i (R_i \times A_i \times C_i)}{\sum_i (R_i \times A_i)},$$

where I denotes a plant; R_i = receipts for plant I; A_i average heat content for receipts at plant I; and C_i = cost in cents per million Btu for plant I.

The weighted average cost in dollars per unit is calculated using the following formula:

$$\text{Weighted Average Cost} = \frac{U \sum_i (R_i \times A_i \times C_i)}{10^8 \sum_i R_i},$$

where I denotes a plant; R_i = receipts for plant I; A_i = average heat content for receipts at plant I; U = unit conversion; and, C_i = cost in cents per million Btu for plant I.

Form EIA-861

Data for the Form EIA-861 are collected at the utility level from all electric utilities in the United States, its territories, and Puerto Rico. Form EIA-861 data in this publication are for the United States only. These data are then aggregated to provide geographic totals at the State, NERC region, Census division, and national level. Sources and disposition of data are also provided by utility class of ownership and retail consumer class of service. Average revenue (nominal dollars) per kilowatthour of electricity sold is calculated by dividing total annual retail revenue (nominal dollars) by the total annual retail sales of electricity.

Average revenue per kilowatthour is defined as the cost per unit of electricity sold and is calculated by dividing retail electric revenue by the corresponding sales of electricity. The average revenue per kilowatthour is calculated for all consumers and for each sector (residential, commercial, industrial, and other sales).

Electric utilities typically employ a number of rate schedules within a single sector. These alternative rate schedules reflect the varying consumption levels and patterns of consumers and their associated impact on the costs to the electric utility for providing electrical service. The average revenue per kilowatthour reported in this publication by sector represents a weighted average of consumer revenue and sales within that sector and across sectors for all consumers.

The electric revenue used to derive the average revenue per kilowatthour is the operating revenue reported by the electric utility. Operating revenue includes energy charges, demand charges, consumer service charges, environmental surcharges, fuel adjustments, and other miscellaneous charges.

Electric utility operating revenues cover, among other costs of service, State and Federal income taxes and taxes other than income taxes paid by the utility. The Federal component of these taxes are, for the most part, "payroll" taxes. State and local authorities tax the value of plant (property taxes), the amount of revenues (gross receipts taxes), purchases of materials and services (sales and use taxes), and a potentially long list of other items that vary extensively by taxing authority. Taxes deducted from employees' pay (such as Federal income taxes and employees' share of social security taxes) are not a part of the utility's "tax costs," but are paid to the taxing authorities in the name of the employees. These taxes are included in the utility's cost of service (for example, revenue requirements) and are included in the amounts recovered from consumers in rates and reported in operating revenues.

Electric utilities, like many other business enterprises, are required by various taxing authorities to collect and remit taxes assessed on their consumers. In this regard, the electric utility serves as an agent for the taxing authority. Taxes assessed on the consumer, such as a gross receipts tax or sales tax, are called "pass through" taxes. These taxes do not represent a cost to the utility and are not recorded in the operating revenues of the utility. However, taxing authorities differ as to whether a specific tax is assessed on the utility or the consumer—which, in turn, determines whether or not the tax is included in the operating revenue of the electric utility.

Form EIA-860A

Data from the Form EIA-860A are submitted at the generating unit level and are then aggregated to provide total capacity by energy source and geographic area. In addition, at the national level, data are aggregated by prime mover.

Estimated values for net summer and net winter capability for electric generating units were developed by use of a regression formula. The formula is used to estimate values for existing units where data are missing and for projected units. It was found that a zero-intercept linear regression works very well for estimating capability based on nameplate capacity. The only parameter then is the slope ($\hat{b}$) that is used to relate capacity to capability as follows: $\hat{y} = \hat{b}x$, where $\hat{y}$ is the estimated capability, and x is the known nameplate capacity. There will be a different value for $\hat{b}$ for different prime movers and for summer and winter capabilities and it will also depend upon the age of the generator. For more details see the *Inventory of Power Plants*.

Form EIA-860B

Gross electricity generation data from the Form EIA-860B, reported by generator, are aggregated to provide totals by energy source and geographic area. Nonutility power producers report gross electricity generated on the Form EIA-860B, unlike electric utilities that report net generation on various EIA and FERC forms. Nonutilities generally do not measure and record electrical consumption used solely for the production of electricity. Nonutility generators and associated auxiliary equipment are often an integral part of a manufacturing or other industrial process and individual watthour meters are not generally installed on auxiliary equipment.

Estimated values for net generation from nonutility power producers were developed by EIA using gross generation, prime mover, fuels, and type of air pollution control data reported on the Form EIA-860B. The difference between gross and net generation is the electricity consumed by auxiliary equipment and environmental control devices such as pumps, fans, coal pulverizers, particulate collectors, and flue gas desulfurization (FGD) units. The difference between gross and net generation is sometimes called parasitic load. In smaller power plants rotating auxiliaries are almost always electric motors. In large power plants that produce steam, rotating auxiliaries can be powered by either steam turbines or electric motors and sometimes both because of cold startup requirements.

This methodology for estimating net generation from gross generation is based on determining typical energy consumption for auxiliary electrical equipment associated with electrical generators. For instance, wind turbines have none of the auxiliaries common to a coal-burning power plant such as a coal pulverizers, fans, and emission controls. On the other hand, windfarms do consume electricity since automatic, computer-based control systems are used to control blade pitch and speed thereby affecting generator electricity output.

Shown below are the conversion factors used to estimated net generation by nonutility generators. The factors are typical of a modern electric power plant but could vary significantly between individual plants. Net generation is calculated by multiplying the appropriate conversion factor by the reported gross electrical generation.

These conversion factors were estimated by the staff of the Office of Coal, Nuclear, Electric and Alternate Fuels, Energy Information Administration. The primary reference used in developing the conversion factors was *Steam, Its Generation and Use,* 40th Edition, Babcock & Wilcox, Barberton, Ohio.

Prime Mover Type	Gross-to-Net Generation Conversion Factor
Gas (Combustion) Turbine)	.98
Steam Turbine	.97[a]
Internal Combustion	.98
Wind Turbine	.99
Solar-Photovoltaic	.99
Hydraulic Turbine	.99
Fuel Cell	.99
Other	.97

[a]Factor reduced by .01 if the facility has flue gas particulate collectors and another .03 if the facility has flue gas desulfurization (FGD) equipment. Facilities under 25 megawatts and burning coal in traditional boilers (e.g., not fluidized bed boilers) are assumed to have particulate and FGD equipment.

Average Heat Content

Heat content values (Table C1) collected on the FERC Form 423 were used to convert the consumption data from the Form EIA-759 into Btu. Respondents to FERC Form 423 represent a subset of all generating plants (steam plants with a capacity of 50 megawatts or larger), while Form EIA-759 respondents generally represent generating plants with a combined capacity of 25 or more megawatts. The results, therefore, may not be completely representative.

Quality of Data

The CNEAF office is responsible for routine data improvement and quality assurance activities. All operations in this office are done in accordance with formal standards established by the EIA. These standards are the measuring rod necessary for quality statistics. Data improvement efforts include verification of data-keyed input by automatic computerized methods, editing by subject matter specialists, and follow-up on nonrespondents. The CNEAF office supports the quality assurance efforts of the data

collectors by providing advisory reviews of the structure of information requirements, and of proposed designs for new and revised data collection forms and systems. Once implemented, the actual performance of working data collection systems is also validated. Computerized respondent data files are checked to identify those who fail to respond to the survey. By law, nonrespondents may be fined or otherwise penalized for not filing a mandatory EIA data form. Before invoking the law, the EIA tries to obtain the required information by encouraging cooperation of nonrespondents.

Completed forms received by the CNEAF office are sorted, screened for completeness of reported information, and keyed onto computer tapes for storage and transfer to random access data bases for computer processing. The information coded on the computer tapes is manually spot-checked against the forms to certify accuracy of the tapes. To ensure the quality standards established by the EIA, formulas that use the past history of data values in the data base have been designed and implemented to check data input for err ors automatically. Data values that fall outside the ranges prescribed in the formulas are verified by telephoning respondents to resolve any discrepancies.

Conceptual problems affecting the quality of data are discussed in the report, *An Assessment of the Quality of Selected EIA Data Series: Electric Power Data*. This report is published by the Energy Information Administration (Office of Statistical Standards). See item 2 in Appendix A.

Data Precision

Monthly sample survey data have both sampling and nonsampling errors. Sampling errors may be expected since all data are not collected and, therefore, must be mathematically estimated. (Note that the annual series for a monthly sample is not subject to sampling error because it is a census). Nonsampling errors are the result of incorrect allocation of data (for example, transcriptions or misclassifications) and can be difficult to control and estimate. A study of coefficients of variance and data revisions was conducted so that the appropriate levels of precision, based on the accuracy and completeness of the data from which the estimates are derived, is provided in this report for average revenue per kilowatthour of electricity sold. It was judged that three significant digits are justified for average revenue per kilowatthour of electricity sold at the U.S. level except for monthly data prior to 1990 where two significant digits are more appropriate.

Data Imputation

It may become necessary (as in March and April 1996 FERC Form 423 data) to impute for some data, even if a 100-percent census is normally collected without incident. In such cases, a modeling approach, similar to what is done for the Form EIA-826, can be implemented. The estimation methodologies for model sampling and model imputation are identical.

Data Editing System

Data from the form surveys are edited on a monthly basis using automated systems. The edit includes both deterministic checks, in which records are checked for the presence of required fields and their validity; and statistical checks, in which estimation techniques are used to validate data according to their behavior in the past and in comparison to other current fields. When all data have passed the edit process, the system builds monthly master files, which are used as input to the *EPM*.

Confidentiality of the Data

In general, the data collected on the forms used for input to this report are not confidential. However, data from the Form EIA-900, "Monthly Nonutility Power Report," and from the Form EIA-860B, "Annual Electric Generator Report – Nonutility," are considered confidential and must adhere to EIA's "Policy on the Disclosure of Individually Identifiable Energy Information in the Possession of the EIA" (45Federal Register 59812 (1980)).

Rounding Rules for Data

Given a number with r digits to the left of the decimal and d+t digits in the fraction part, with d being the place to which the number is to be rounded and t being the remaining digits which will be truncated, this number is rounded to r+d digits by adding 5 to the (r+d+1)th digit when the number is positive or by subtracting 5 when the number is negative. The t digits are then truncated at the (r+d+1)th digit. The symbol for a rounded number truncated to zero is (*).

Data Correction Procedure

The Office of Coal, Nuclear, Electric and Alternate Fuels has adopted the following policy with respect to the revision and correction of recurrent data in energy publications:

1. Annual survey data collected by this office are published either as preliminary or final when first appearing in a data report. Data initially released as

preliminary will be so noted in the report. These data will be revised, if necessary, and declared final in the next publication of the data.

2. All monthly and quarterly survey data collected by this office are published as preliminary. These data are revised only after the completion of the 12-month cycle of the data. No revisions are made to the published data before this.

3. The magnitudes of changes due to revisions experienced in the past will be included in the data reports, so that the reader can assess the accuracy of the data.

4. After data are published as final, corrections will be made only in the event of a greater than one percent difference at the national level. Corrections for differences that are less than the before-mentioned threshold are left to the discretion of the Office Director. Note that in this discussion, changes or revisions are referred to as "errors."

In accordance with policy statement number 3, the mean value (unweighted average) for the absolute values of the 12 monthly revisions of each item are provided at the U.S. level for the past 4 years (Table C2). For example, the mean of the 12 monthly absolute errors (absolute differences between preliminary and final monthly data) for coal-fired generation in 1995 was 49. That is, on average, the absolute value of the change made each month to coal-fired generation was 49 million kilowatthours.

The U.S. total net summer capability, updated monthly in the EPM (Table 1), is based solely on new electric generating units and retirements which come to the attention of the EIA during the year through telephone calls with electric utilities and on the Form EIA-759, "Monthly Power Plant Report," and may not include all activity for the month. Data on net summer capability, including new electric generating units, are collected annually on the

Form EIA-860A, "Annual Electric Generator Report – Utility," and Form 860B "Annual Electric Generator Report – Nonutility."

Use of the Glossary

The terms in the glossary have been defined for general use. Restrictions on the definitions as used in these data collection systems are included in each definition when necessary to define the terms as they are used in this report.

Table C1. Average Heat Content of Fossil-Fuel Receipts, September 2002

Census Division and State	Coal (Btu per ton)[1]	Petroleum (Btu per barrel)	Gas (Btu per thousand cubic feet)
New England	**26,967,481**	**6,211,617**	**1,035,183**
Connecticut	-	-	-
Maine	-	-	-
Massachusetts	26,118,000	6,330,260	1,030,274
New Hampshire	27,011,940	5,787,600	1,047,000
Rode Island	-	-	-
Vermont	-	-	-
Middle Atlantic	**25,845,834**	**6,400,631**	**1,016,950**
New Jersey	26,063,470	6,376,426	-
New York	26,093,270	6,404,916	1,016,950
Pennsylvania	25,458,678	5,922,000	-
East North Central	**20,851,950**	**6,089,349**	**773,322**
Illinois	19,198,688	5,764,022	1,021,967
Indiana	21,259,926	5,755,717	1,003,000
Michigan	20,371,101	6,230,873	733,152[a]
Ohio	24,484,150	5,786,978	1,024,649
Wisconsin	17,801,055	5,880,000	1,001,349
West North Central	**16,713,236**	**6,408,117**	**1,007,249**
Iowa	17,144,886	5,880,000	1,001,353
Kansas	17,185,562	6,591,598	1,008,399
Minnesota	17,754,938	5,799,468	1,005,790
Missouri	17,796,468	5,799,479	1,008,308
Nebraska	17,268,188	5,801,880	1,007,931
North Dakota	13,130,462	5,819,863	-
South Dakota	17,029,802	-	-
South Atlantic	**24,504,983**	**6,406,599**	**1,035,360**
Delaware	-	-	1,032,000
District of Columbia	-	-	-
Florida	24,723,284	6,418,219	1,035,684
Georgia	23,318,896	5,817,000	1,032,508
Maryland	-	-	-
North Carolina	24,827,594	5,812,727	1,032,000
South Carolina	25,363,378	5,815,095	1,028,000
Virginia	25,532,916	6,381,585	1,029,787
West Virginia	24,352,857	5,861,623	1,000,000
East South Central	**22,461,135**	**5,855,354**	**1,034,630**
Alabama	21,344,694	5,775,014	1,040,627
Kentucky	23,020,918	5,866,908	1,025,000
Mississippi	23,675,650	5,991,389	1,030,242
Tennessee	22,893,738	5,875,800	-
West South Central	**16,810,286**	**5,990,102**	**1,030,073**
Arkansas	17,340,372	5,909,916	1,017,133
Louisiana	15,062,216	6,483,670	1,036,630
Oklahoma	17,377,006	-	1,027,482
Texas	16,672,979	5,880,000	1,026,568
Mountain	**19,646,338**	**5,846,179**	**1,016,693**
Arizona	20,371,438	5,852,028	1,018,814
Colorado	19,366,816	-	990,304
Idaho	-	-	-
Montana	16,764,120	5,922,000	1,134,261
Nevada	22,552,086	-	1,022,947
New Mexico	19,566,234	5,712,000	1,018,514
Utah	22,248,784	5,879,979	1,058,000
Wyoming	17,490,558	5,880,000	1,044,000
Pacific Contiguous	**17,501,842**	**-**	**1,011,191**
California	-	-	1,009,836
Oregon	17,501,842	-	1,020,000
Washington	-	-	-
Pacific Noncontiguous	**-**	**-**	**1,000,000**
Alaska	-	-	1,000,000
Hawaii	-	-	-
U.S. Average	**20,395,969**	**6,386,909**	**1,023,413**

[1] Data represents weighted values.

[a] = Includes blast furnace gas which has a heat content of 74,000 Btu per thousand cubic feet.

Note: • Data for 2002 are preliminary.

Source: • Federal Energy Regulatory Commission, FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants."

Table C2. Comparison of Preliminary Versus Final Published Data at the U.S. Level, 1995 Through 1999

Item	Mean Absolute Value of Change				
	1995	1996	1997	1998	1999
Nonutility					
Generation (million kilowatthours)					
Coal	NA	NA	NA	NA	2,272
Petroleum	NA	NA	NA	NA	1,205
Gas	NA	NA	NA	NA	811
Hydroelectric	NA	NA	NA	NA	936
Nuclear	NA	NA	NA	NA	28
Other[1]	NA	NA	NA	NA	504
Total	NA	NA	NA	NA	4,559
Consumption					
Coal (thousand short tons)	NA	NA	NA	NA	1,767
Petroleum (thousand barrels)	NA	NA	NA	NA	2,694
Gas (million cubic feet)	NA	NA	NA	NA	17,168
Stocks[1]					
Coal (thousand short tons)	NA	NA	NA	NA	316
Petroleum (thousand barrels)	NA	NA	NA	NA	40
Utility					
Generation (million kilowatthours)					
Coal	49	162	201	201	288
Petroleum	6	64	53	39	103
Gas	38	84	168	102	147
Hydroelectric	6	298	325	322	354
Nuclear	0	4	65	0	0
Other	0	0	0	0	0
Total	11	462	285	504	695
Consumption					
Coal (thousand short tons)	27	105	169	114	147
Petroleum (thousand barrels)	1	94	43	76	228
Gas (million cubic feet)	300	899	1,243	1,084	1,668
Stocks[1]					
Coal (thousand short tons)	310	233	501	229	118
Petroleum (thousand barrels)	239	201	130	98	165
Retail Sales (million kilowatthours)					
Residential	79	345	350	626	454
Commercial	780	476	1,265	175	2,233
Industrial	141	1,129	257	771	654
Other[2]	167	267	363	33	553
Total	694	1,153	1,724	1,466	3,894
Revenue (million dollars)					
Residential	17	2	3	42	27
Commercial	51	29	60	17	214
Industrial	23	46	32	30	34
Other[2]	5	1	31	2	3
Total	22	46	62	79	277
Average Revenue per Kilowatthour (cents)[3]					
Residential	.01	.03	.03	.02	.01
Commercial	.01	.01	.05	.01	.06
Industrial	.03	.01	.02	.01	.01
Other[3]	.20	.22	.07	.02	.39
Total	.01	.01	.02	.01	.03
Receipts					
Coal (thousand short tons)	34	61	71	84	148
Petroleum (thousand barrels)	2	77	28	20	89
Gas (million cubic feet)	227	566	122	365	157
Cost (cents per million Btu)[3]					
Coal	.10	.06	.16	.23	.22
Petroleum	.01	.01	*	*	.01
Gas	.15	.87	.68	.35	.09

[1] Stocks are end of month values.
[2] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.
[3] Data represents weighted values.
* = For detailed data, the absolute value is less than 0.5; for percentage calculations, the absolute value is less that 0.05 percent.
NA = Not Available.
Notes: • Change refers to the difference between estimates or preliminary monthly data published in the *Electric Power Monthly* (EPM) and the final monthly data published in the EPM. • Mean absolute value of change is the unweighted average of the absolute changes.
Sources: • Energy Information Administration: Form EIA-900, "Monthly Nonutility Power Plant Report"; For EIA-759, "Monthly Power Plant Report"; Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions"; and Form EIA-861, "Annual Electric Utility Report."

Table C3. Unit-of-Measure Equivalents for Electricity

Unit	Equivalent
Kilowatt (kW)	1,000 (One Thousand) Watts
Megawatt (MW)	1,000,000 (One Million) Watts
Gigawatt (GW)	1,000,000,000 (One Billion) Watts
Terawatt (TW)	1,000,000,000,000 (One Trillion) Watts
Gigawatt	1,000,000 (One Million) Kilowatts
Thousand Gigawatts	1,000,000,000 (One Billion) Kilowatts
Kilowatthours (kWh)	1,000 (One Thousand) Watthours
Megawatthours (MWh)	1,000,000 (One Million) Watthours
Gigawatthours (GWh)	1,000,000,000 (One Billion) Watthours
Terawatthours (TWh)	1,000,000,000,000 (One Trillion) Watthours
Gigawatthours	1,000,000 (One Million) Kilowatthours
Thousand Gigawatthours	1,000,000,000(One Billion Kilowatthours

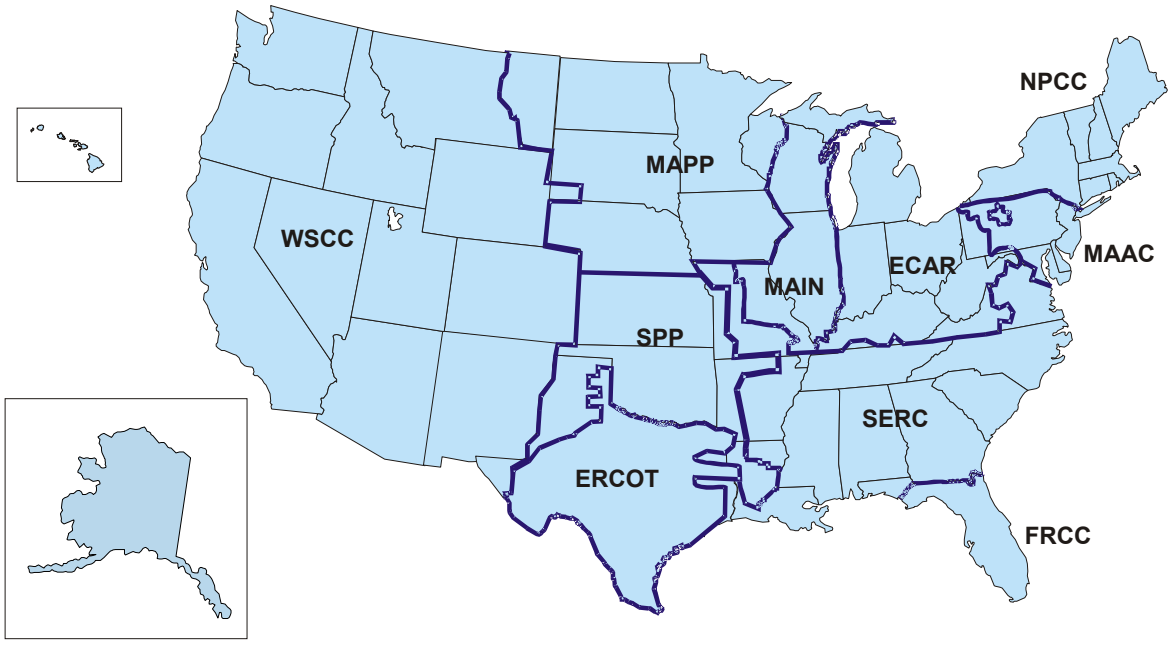
Source: Energy Information Administration.

Table C4. Comparison of Sample Versus Census Published Data at the U.S. Level, 1998 and 1999

Item	1998			1999		
	Sample	Census	Difference (percent)	Sample	Census	Difference (percent)
Utility						
Generation (million kilowatthours)						
Coal	1,808,070	1,807,480	*	1,773,499	1,767,679	-0.3
Petroleum	105,743	105,440	-0.3	85,737	82,981	-3.3
Gas	308,858	309,222	0.1	297,346	296,381	-0.3
Other[1]	990,948	990,029	-0.1	1,026,354	1,026,632	*
Total	**3,213,620**	**3,212,171**	*	**3,182,936**	**3,173,674**	**-0.3**
Consumption						
Coal (1,000 short tons)	912,060	910,867	-0.1	896,616	894,120	-0.3
Petroleum (1,000 barrels)	179,401	178,614	-0.4	148,868	143,830	-3.5
Gas (1,000 Mcf)	326,268	3,258,054	-0.1	3,125,417	3,113,419	-0.4
Stocks[2]						
Coal (1,000 short tons)	121,384	120,501	-0.7	128,929	129,041	0.1
Petroleum (1,000 barrels)	53,893	53,790	-0.2	45,191	44,312	-2.0
Retail Sales (million kilowatthours)						
Residential	1,131,520	1,127,735	-0.3	1,139,481	1,140,761	0.1
Commercial	950,476	968,528	1.9	975,196	970,601	-0.5
Industrial	1,055,459	1,040,038	-1.5	1,050,363	1,017,783	-3.2
Other[3]	100,260	103,518	3.1	100,316	106,754	6.0
All Sectors	**3,237,715**	**3,239,818**	**0.1**	**3,265,356**	**3,235,899**	**-0.9**
Revenue (million dollars)						
Residential	93,511	93,164	-0.4	93,148	93,142	*
Commercial	70,630	71,769	1.6	70,190	70,492	0.4
Industrial	47,391	46,550	-1.8	46,442	45,056	-3.1
Other[3]	6,814	6,863	0.7	6,763	6,783	0.3
All Sectors	**218,346**	**218,346**	*	**216,544**	**215,473**	**-0.5**
Average Revenue per Kilowatthour (cents)[4]						
Residential	8.26	8.26	*	8.17	8.16	-0.1
Commercial	7.43	7.41	-0.3	7.20	7.26	0.8
Industrial	4.49	4.48	-0.3	4.42	4.43	0.1
Other[3]	6.80	6.63	-2.5	6.74	6.35	-6.1
All Sectors	**6.74**	**6.74**	**-0.1**	**6.63**	**6.66**	**0.4**

[1] Includes geothermal, wood, waste, wind, and solar.
[2] Stocks are end-of-month values.
[3] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.
[4] Data represent weighted values.
* = For detailed data, the absolute value is less than 0.5; for percentage calculations, the absolute values is less than 0.05 percent.
NA = Not Available.
Notes: • The average revenue per kilowatthour is calculated by dividing revenue by sales. • Totals may not equal sum of components because of independent rounding. • Percent difference is calculated before rounding.
Sources: Energy Information Administration, Form EIA-900, "Monthly Nonutility Power Report;" Form EIA-867, "Annual Nonutility Power Producer Report;" Form EIA-759, "Monthly Power Plant Report;" Form EIA-861, "Annual Electric Utility Report;" Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions."

Figure C1. North American Electric Reliability Council Regions for the Contiguous United States, Alaska and Hawaii



ECAR – East Central Area Reliability Coordination Agreement
ERCOT – Electric Reliability Council of Texas
FRCC – Florida Reliability Coordinating Council
MAAC – Mid-Atlantic Area Council
MAIN – Mid-Atlantic Interconnected Network
MAPP – Mid-Continent Area Power Pool
NPCC – Northeast Power Coordinating Council
SERC – Southeastern Electric Reliability Council
SPP – Southwest Power Pool
WSCC – Western Systems Coordinating Council

Source: North American Electric Reliability Council.

Table C5. Relative Standard Error for Electric Utility Net Generation by State, October 2002

(Percent)

State	Coal	Petroleum	Gas	Hydroelectric	Nuclear	Other[1]
Alabama	-	-	-	-	-	-
Alaska	-	NM	0.63	NM	-	NM
Arizona	-	-	-	-	-	-
Arkansas	-	2.6	-	2.82	-	-
California	-	-	1.21	0.75	-	-
Colorado	-	NM	1.39	6.18	-	-
Connecticut	-	NM	-	NM	-	NM
Delaware	-	NM	-	-	-	-
Florida	-	0.02	0.02	-	-	-
Georgia	0.02	-	NM	1.92	-	-
Hawaii	-	-	-	-	-	-
Idaho	-	-	-	2.15	-	-
Illinois	1.63	NM	NM	NM	-	-
Indiana	0.19	2.23	1.93	-	-	-
Iowa	0.52	NM	NM	-	-	-
Kansas	-	9.58	NM	-	-	-
Kentucky	0.18	-	-	-	-	-
Louisiana	-	0.42	0.55	-	-	-
Maine	-	-	-	NM	-	-
Maryland	-	NM	NM	-	-	-
Massachusetts	NM	NM	NM	NM	-	-
Michigan	0.35	4.92	4	NM	-	-
Minnesota	0.72	3.64	NM	1.33	-	-
Mississippi	0.6	8.97	0.75	-	-	-
Missouri	-	4.82	6.07	NM	-	-
Montana	-	NM	-	0.72	-	-
Nebraska	-	NM	NM	0.13	-	-
Nevada	-	-	-	-	-	-
New Hampshire	-	-	-	-	-	-
New Jersey	-	-	-	-	-	-
New Mexico	0.34	-	4.47	NM	-	-
New York	-	0.52	0.26	0.5	-	-
North Carolina	-	-	-	0.22	-	-
North Dakota	-	-	-	-	-	-
Ohio	0.22	2.25	NM	-	-	-
Oklahoma	-	NM	0.58	-	-	-
Oregon	-	-	-	-	-	-
Pennsylvania	-	NM	NM	6.31	-	-
Rhode Island	-	NM	-	-	-	-
South Carolina	-	1.36	-	NM	-	-
South Dakota	-	-	-	-	-	-
Tennessee	-	-	-	-	-	-
Texas	-	NM	0.31	NM	-	-
Utah	-	NM	5.46	NM	-	-
Vermont	-	NM	-	NM	-	-
Virginia	-	5.57	1.85	-3.15	-	-
Washington	-	-	-	0.12	-	-
West Virginia	-	-	-	-	-	-
Wisconsin	0.15	NM	6.22	4.12	-	-
Wyoming	-	-	-	7.74	-	-

[1] Includes geothermal, wood, waste, wind, and solar.

NM = This estimated value is not meaningful due to either insufficient data, large data revisions or the impact that round-off has on small numbers.

Notes: • Relative Standard Error is designed to indicate error due to sampling. However, nonsampling error is important for all surveys, census or sample. See technical notes for further information • Estimates for 2002 are preliminary.

Source: • Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C6. Relative Standard Error for Electric Utility Fuel Consumption by State, October 2002
(Percent)

State	Consumption		
	Coal	Petroleum	Gas
Alabama	-	-	-
Alaska	-	NM	0.96
Arizona	-	-	-
Arkansas	-	2.28	-
California	-	-	1.12
Colorado	-	NM	1.49
Connecticut	-	NM	-
Delaware	-	NM	-
Florida	-	0.03	0.01
Georgia	0.05	-	7.91
Hawaii	-	-	-
Idaho	-	-	-
Illinois	1.53	NM	NM
Indiana	0.2	4.28	1.08
Iowa	0.49	NM	8.14
Kansas	-	9.95	NM
Kentucky	0.18	-	-
Louisiana	-	0.48	0.31
Maine	-	-	-
Maryland	-	NM	NM
Massachusetts	NM	NM	5.83
Michigan	0.35	4.7	1.32
Minnesota	1.11	NM	NM
Mississippi	0.65	7.33	0.43
Missouri	-	NM	4.15
Montana	-	NM	-
Nebraska	-	NM	7.01
Nevada	-	-	-
New Hampshire	-	-	-
New Jersey	-	-	-
New Mexico	0.32	-	5.23
New York	-	0.5	0.16
North Carolina	-	-	-
North Dakota	-	-	-
Ohio	0.27	1.77	5.02
Oklahoma	-	NM	0.29
Oregon	-	-	-
Pennsylvania	-	NM	NM
Rhode Island	-	NM	-
South Carolina	-	0.88	-
South Dakota	-	-	-
Tennessee	-	-	-
Texas	-	NM	0.21
Utah	-	NM	6.2
Vermont	-	NM	-
Virginia	-	5.57	0.99
Washington	-	-	-
West Virginia	-	-	-
Wisconsin	0.13	NM	2.86
Wyoming	-	-	-

NM = This estimated value is not meaningful due to either insufficient data, large data revisions or the impact that round-off has on small numbers.

Notes: • Relative Standard Error is designed to indicate error due to sampling. However, nonsampling error is important for all surveys, census or sample. See technical notes for further information • Estimates for 2002 are preliminary.

Source: • Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C7. Relative Standard Error for Nonutility Net Generation by Census Division, October 2002

(Percent)

Census Division	Coal	Petroleum	Gas	Hydroelectric	Nuclear	Other[1]
New England	4.1	4.9	2.3	5.5	-	6.5
Mid Atlantic	0.5	7.2	2.8	4.9	-	5.0
East North Central	0.7	NM	7.3	NM	-	NM
West North Central	NM	NM	NM	NM	-	9.5
South Atlantic	1.1	8.1	8.5	1.7	-	3.8
East South Central	2.9	NM	NM	-	-	9.8
West South Central	0.3	NM	1.8	1.6	-	2.2
Mountain	1.0	NM	3.0	3.1	-	NM
Pacific Contiguous	1.8	NM	2.7	NM	-	3.0
Pacific Noncontiguous	NM	NM	NM	NM	-	NM

[1] Includes geothermal, wood, waste, wind, and solar.

NM = This estimated value is not meaningful due to either insufficient data, large data revisions or the impact that round-off has on small numbers.

Notes: • Relative Standard Error is designed to indicate error due to sampling. However, nonsampling error is important for all surveys, census or sample. See technical notes for further information • Estimates for 2002 are preliminary.

Source: • Energy Information Administration, Form EIA-906, "Power Plant Report."

Table C8. Relative Standard Error for Nonutility Fuel Consumption and Stocks by Census Division, October 2002

(Percent)

Census Division	Consumption			Stocks	
	Coal	Petroleum	Gas	Coal	Petroleum
New England	6.6	4.4	3.7	-	-
Mid Atlantic	0.8	5.5	5.6	-	-
East North Central	0.8	NM	NM	-	-
West North Central	NM	NM	NM	-	-
South Atlantic	1.8	9.4	4.0	-	-
East South Central	4.4	NM	NM	-	-
West South Central	0.5	NM	3.5	-	-
Mountain	1.2	NM	4.4	-	-
Pacific Contiguous	1.7	NM	3.1	-	-
Pacific Noncontiguous	NM	9.6	NM	-	-

NM = This estimated value is not meaningful due to either insufficient data, large data revisions or the impact that round-off has on small numbers.

Notes: • Relative Standard Error is designed to indicate error due to sampling. However, nonsampling error is important for all surveys, census or sample. See technical notes for further information • Estimates for 2002 are preliminary.

Source: • Energy Information Administration, Form EIA-906, "Power Plant Report."